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(71) Applicant *(for all designated States except US)*: **BESPAK PLC** [GB/GB]; Bergen Way, North Lynn Industrial Estate, King's Lynn, Norfolk PE30 2JJ (GB).

(72) Inventor; and

(75) Inventor/Applicant *(for US only)*: **WARBY, Richard, John** [GB/GB]; 93 Church Road, Emneth, Wisbech, Cambridgeshire PE14 8AF (GB).

(74) Agent: **BOULT WADE TENNANT**; Verulam Gardens, 70 Gray's Inn Road, London WC1X 8BT (GB).

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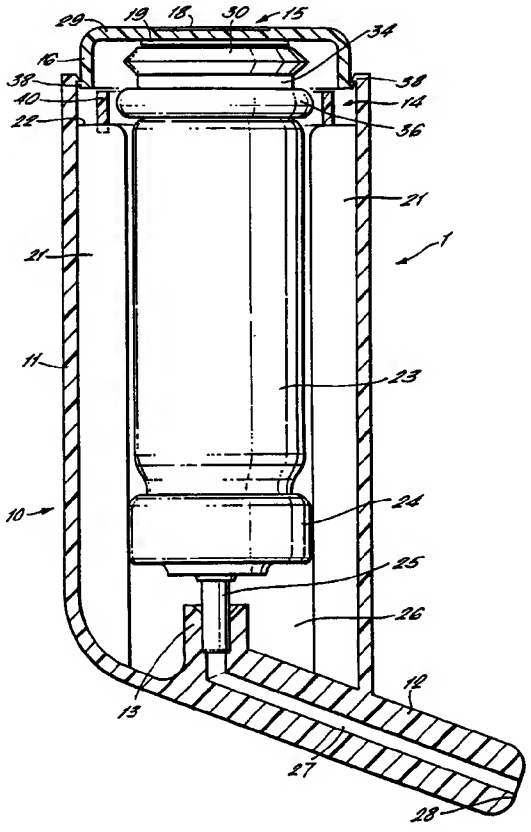
(54) Title: IMPROVEMENTS IN OR RELATING TO DISPENSING APPARATUS



(57) Abstract: The present invention relates to improvements in or relating to dispensing apparatus and particularly to dispensing apparatus incorporating a metered dose dispenser. The apparatus comprises a housing (10) adapted to receive a dispensing container (23), a depressible actuator (15) for moving a dispensing container relative to the housing to release a dose of product and locking means (40) movable from a first position, in which the actuator is free to move, to a second locked position, in which the actuator is prevented from moving. The apparatus also comprises an expandible chamber (36), means for expanding the expandible chamber such that the locking means is moved from the first position to the second position, and means for contracting the expandible chamber at a controlled rate to release the locking means and to allow the actuator to move.

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IMPROVEMENTS IN OR RELATING TO DISPENSING APPARATUS

The present invention relates to improvements in or relating to dispensing apparatus and particularly to dispensing apparatus incorporating a metered dose dispenser.

Metered dose dispensers are well-known in the art and are used for accurately and consistently dispensing metered volumes of products. In particular, metered dose dispensers are used for the administration of pharmaceutical products, where the consistency and accuracy of dosing is especially important. The metered dose dispenser may be a metered dose inhaler in which the product is dispensed as an aerosol for inhalation. Alternatively, the metered dose dispenser may be a dispenser configured to dispense products sub-lingually. For some drugs there is only a small margin between the effective dose for the treatment of the condition and a dose that will produce unwanted side effects or in more extreme cases severe or toxic effects. In addition, if administration is faster than the drug is eliminated from the body then there will be a rise in the amount of drug in the body; again side effects or toxicity may occur. This can be a particular problem with the young, old, renally impaired patients and patients with a reduced ability to metabolise the drug to an inactive form. In these cases, additional care is taken to titrate the dose and dosing frequency to the individual patient.

Some pharmaceutical products, for example morphine or other strong analgesics used in the treatment of both chronic and acute severe pain, can become harmful to the patient if used excessively. They can also become addictive. Other classes of

drugs where dose and frequency control are of importance are the various cytotoxic and other drugs used in the treatment of tumours.

According to the present invention, there is provided dispensing apparatus for dispensing a product comprising a housing adapted to receive a dispensing container, a depressible actuator for moving a dispensing container relative to the housing to release a dose of product, locking means movable from a first position, in which the actuator is free to move, to a second locked position, in which the actuator is prevented from moving, an expandable chamber, means for expanding the expandable chamber such that the locking means is moved from the first position to the second position, and means for contracting the expandable chamber at a controlled rate to release the locking means and allow the actuator to move.

The means for expanding the expandable chamber comprises a bellows and a one-way valve is provided between the bellows and the expandable chamber.

The means for contracting causes the expandable chamber to contract at a predetermined rate.

The material of the expandable chamber may allow air to pass therethrough at a predetermined rate; the material forming the means for contracting the expandable chamber. Alternatively the one-way valve may allow air to leak out of the expandable chamber at a predetermined rate; the one-way valve forming the means for contracting the expandable chamber.

The locking means comprises a split ring encircling the expandable chamber.

The split ring is supported on longitudinally formed ribs of the housing.

The size of the expandable chamber and the relative spacing of the expandable chamber and locking means is such that the locking means is moved from the

first position to the second position after a predetermined number of actuations of the dispensing apparatus.

The depressible actuator is cup-shaped and provided with a rim. A plate is connected to the housing located between the bellows and the expandable chamber and on which the bellows is supported in use. The plate is connected to the housing be means of inwardly directed projections on an inner surface of the housing. The actuator rim is provided with cut-out portions to accommodate movement of the actuator rim past the bellows support plate.

In one embodiment the locking means, expandable chamber, means for expanding the expandable chamber and means for contracting the expandable chamber are located above a dispensing container when inserted in the housing.

In another embodiment the locking means, expandable chamber, means for expanding the expandable chamber and means for contracting the expandable chamber are located beneath a dispensing container when inserted in the housing.

The present invention also provides a method of regulating the operation of a dispensing apparatus comprising the steps of setting a locking means in a first position, in which position an actuator is free to move, depressing the actuator to thereby move a dispensing container relative to a housing to release a dose of product, arranging for successive depressions of the actuator to incrementally expand an expandable chamber positioned such that expansion of the expandable chamber moves the locking means to a second locked position, in which position the actuator is prevented from moving, and arranging for the expandable chamber to contract at a controlled rate to release the locking means to allow the actuator to move.

An advantage of the present invention is that the time interval between one or more actuations of the dispensing apparatus may be controlled so as to prevent overdosing. A further advantage is that the means for controlling the time period between one or more actuations is automatic, pre-set and tamper-resistant. In addition, the dispensing apparatus according to the present invention is operated by a user in the same manner as conventional apparatus. Thus, a user is not required to be trained in the use of a new device.

Embodiments of the present invention will now be described, by way of example only, with reference to the following drawings in which:

Figure 1 is a cross-sectional view of a first embodiment of dispensing apparatus according to the present invention;

Figure 2 is a cross-sectional view of an upper end of the apparatus as shown in Figure 1;

Figure 3 is a cross-sectional view taken on line III-III of Figure 2;

Figure 4 is a cross-sectional view taken on line IV-IV of Figure 2;

Figure 5 is a cross-sectional view of an upper part of the apparatus of Figure 1 in a rest position before a first actuation;

Figure 6 is a cross-sectional view of the apparatus of Figure 5 during a first actuation;

Figure 7 is a cross-sectional view of the apparatus of Figure 5 immediately after a first actuation as the actuator button is released;

Figure 8 is a cross-sectional view of the apparatus of Figure 5 during a second actuation;

Figure 9 is a cross-sectional view of the apparatus of Figure 5 immediately after the second actuation; and

Figure 10 is a cross-sectional view of a second embodiment of dispensing apparatus according to the present invention.

Figure 1 depicts a dispensing apparatus 1 shown in combination with a pressurised dispensing container 23 with the apparatus orientated so as to be ready for use such that the pressurised dispensing container 23 is vertical with the valve 24 and valve stem 25 extending downwardly. The pressurised dispensing container 23 contains a product for dispensing in controlled doses, such as a liquid medicament mixed with a volatile propellant liquid.

In the following description, references to vertical and horizontal orientation of components of the dispensing apparatus 1 refer to orientations of such components when the apparatus 1 is held in its normal orientation for use as shown in Figure 1.

The dispensing apparatus 1 comprises a housing 10 having a first portion 11 defining a cylindrical recess or socket 26. An upper end 14 of the first portion 11 is open to allow the dispensing container 23 to be inserted therein. The dispensing container 23 is received as a loose-fit in socket 26 with the valve stem 25 being received in a valve stem receiving block 13.

The first housing portion 11 is provided with six longitudinally extending ribs 21 on its internal surface which project radially inwardly and are preferably equi-spaced around the circumference of the first housing portion 11. The ribs 21 support the dispensing container 23 centrally within the socket 26 whilst allowing the dispensing container 23 to freely move axially relative to the ribs 21. The ribs 21 extend from one end of the first housing portion 11 adjacent a mouthpiece 12 to the opposite (upper) end 14. The upper edges 22 of the longitudinal ribs 21

are located a small distance below the open upper end 14, as shown in Figure 2.

The housing 10 further comprises a second portion being a mouthpiece 12 defining a mouthpiece duct 27, one end of which communicates with an outlet orifice 28 and the other end of which communicates with the valve stem receiving block 13. The mouthpiece 12 may be of a known type configured for inhalation therapy or, as shown in Figure 1, for administration of a product sub-lingually.

The dispensing container 23 is of a type which is actuated by axial depression of the valve stem 25, against an internally located spring bias, to release a metered dose of product through the valve stem 25 where it is conveyed, via mouthpiece duct 27 to outlet orifice 28 where it is dispensed to the user of the dispensing apparatus 1.

An actuator button 15 is located in the open upper end 14 of the first housing portion 11 as shown in Figure 1. The actuator button 15 is preferably a cup-shaped member having a plate-like bottom surface 29 from which depends a peripheral rim 16. The rim 16 is slidingly received inside first housing portion 11. The rim 16 has two opposing rectangular cut-out portions (not shown). The bottom surface 29 is indented with a depression 18 to provide a suitable placement position for the user's finger.

The actuator button 15 is retained in the open end 14 of the first housing portion 11 by means of a suitable snap-fit formation 38. These may be detents on the exterior of the actuator button rim 16 and the interior surface of the first housing portion 11, as most clearly shown in Figure 2. The actuator button 15 is slidable relative to the housing 10. A spigot 60 projects vertically downwards from an underside of the actuator button bottom surface 29.

The dispensing apparatus 1 further comprises a

bellows support 34 in the form of a substantially rectangular plate which extends across the open upper end 14 of the first housing portion 11 as shown in Figures 2 and 4. The plate 34 is located within the first housing portion 11 by means of projections 35 located on the inner surface of the first housing portion 11. The plate 34 is provided with a circular aperture 50 at its centre and a further aperture 51 off-set from the centre of the plate 34. An underside of the bellows support plate 34 around the central aperture 50 is formed into a tubular extension 61. With the apparatus 1 assembled the actuator button spigot 60 projects through the central aperture 50 and into tubular extension 61.

The actuator button 15 is biassed upwardly relative to the housing 10 by means of a helical spring 39 which is located around spigot 60 and extends between the bellows support plate 34 and the underside of the actuator button bottom surface 29.

Above the plate 34 is positioned a bellows 30. The bellows 30 is of a generally toroidal shape having a central aperture through which the actuator button spigot 60 projects when assembled therewith. The bellows 30 has an inlet 31 in an upper surface and an outlet 32 in a lower surface. The outlet 32 is aligned with the off-set aperture 51. The bellows 30 may be formed from a suitable rubber or plastic.

An underside of the actuator button bottom portion 29 is provided with an elastomeric seal 19 aligned with the bellows inlet 31.

Below the bellows support plate 34 is positioned an expandable air chamber 36. The expandable chamber 36 is of a generally toroidal shape having a central aperture through which the tubular extension 61 of the bellows support plate 33 projects when assembled therewith. The expandable air chamber 36 is provided with an inlet 37 in an upper surface, aligned with the

off-set aperture 51. The expandable air chamber 36 is formed from a rubber, plastic, elastomer or similar material. When the apparatus 1 is assembled with the pressurised dispensing container 23, a lower surface of the expandable air chamber 36 rests on an upper end of the pressurised dispensing container 23.

A one-way valve 33 is positioned in off-set aperture 51, between the bellows 30 and expandable air chamber 36, and orientated so as to allow the passage of air from the bellows 30 into the expandable air chamber 36, but not vice versa.

The material of the expandable air chamber 36 is designed to 'leak' air at a fixed, but slow, rate so as to deflate the expandable air chamber over a relatively long period of time. Alternatively the one-way valve 33 may be designed to 'leak' air out of the expandable air chamber 36 at a fixed but slow rate. As explained below this feature is used to reset the apparatus 1.

A lock out member, in the form of a split ring 40, is positioned in the upper end of first housing portion 11, as shown in Figures 2 and 3, longitudinally aligned with the expandable air chamber 36 and resting on the upper edges 22 of the longitudinal ribs 21. The split ring 40 may be unattached to the remainder of the dispensing apparatus 1, but is preferably either attached or fixedly located at one point to one of the ribs 21. In the embodiment shown in Figures 2 and 3 the split ring 40 is provided with two downward extensions 41 which are located either side of a rib 21 such that the ring 40 is free to expand and contract.

Figures 5 and 6 show the apparatus 1 in an "at rest" position before a first actuation of the apparatus 1. In this position the split ring 40 is located inside the peripheral rim 16 of the actuator button 15. In addition, the expandable air chamber 36

is relatively uninflated such that a gap exists between the periphery of the expandable air chamber 36 and the inside of the split ring 40 (as shown in Figure 5). As a result, the actuator button 15 is free to move downwardly relative to the first housing portion 11. Movement of the actuator button 15 relative to the bellows support plate 34 is accommodated be virtue of the cut-out portions of the peripheral rim 16 in which are received the ends of the plate 34. The lowermost end of actuator button spigot 60 is located a small distance above the upper end of the pressurised dispensing container 23.

In use, the mouthpiece 12 is positioned in the user's mouth and the actuator button 15 is depressed using one or more fingers positioned in the depression 18.

As a result of this depression the elastomeric seal 19 of the actuator button 15 comes into contact with the bellows inlet 31, sealing the inlet 31 and preventing the passage of air therethrough. Further downward movement of the actuator button 15 compresses the bellows 30 expelling air therefrom, through the one-way valve 33, into the expandable air chamber 36, thus partially inflating it. As shown in Figure 6, after one actuation the periphery of the expandable air chamber 36 almost touches the inside of the split ring 40. Plate 34 supports the bellows during its compression. The tubular extension 61 prevents the expanding expandable chamber 36 from contacting and fouling the movement of the actuator button spigot 60.

As a result of the downward movement of the actuator button 15, the actuator button spigot 60 contacts the upper end of the pressurised dispensing container 23 and moves the container downwards . Consequently, the valve stem 25 of the pressurised dispensing container 23 is moved relative to the valve 24 to operate the pressurised dispensing container 23

such that a dose of product is dispensed.

After the dose is dispensed the user releases the actuator button 15. Helical spring 39 returns the actuator button 15 to its original "at rest" position and, as shown in Figure 7, quickly enough that the elastomeric seal 19 is separated from the inlet 31 of the bellows 30. As a result, air is free to enter and re-fill the bellows 30 as the bellows 30 recovers its initial configuration due to its inherent elasticity.

The expandable air chamber 36 slowly 'leaks' air either through the material of the chamber itself or through the one-way valve 33. If left unactuated for sufficiently long the expandable chamber will contract to its original size. However, if the apparatus 1 is actuated for a second time soon after the first actuation the expandable air chamber 36 will remain substantially the same size as immediately after the first actuation. A second actuation, as shown in Figure 8, operates in the same manner as described for the first actuation, except that as air is transferred into the expandable air chamber 36 from the bellows 30 the periphery of the expandable air chamber 36 contacts the inside of the split ring 40 as shown in Figure 8, biassing it radially outwardly. Whilst the actuator button 15 is still depressed, radial movement of the split ring 40 is prevented by the presence of the actuator button peripheral rim 16. However, on release of the actuator button 15 and the resulting upward movement of the peripheral rim 16, the split ring 40 is expanded radially outwards such that the split ring 40 is aligned beneath the peripheral rim 16 of the actuator button 15 as shown in Figure 9. In this position further actuations of the dispensing apparatus 1 are prevented since downward movement of the actuator button 15 is prevented by the presence of the split ring 40.

Over a period of time air 'leaks' out of the

expandable air chamber 36. Eventually enough air escapes from the expandable air chamber 36 such that it contracts radially inwards and allows the split ring 40 to contract and move out of alignment with the peripheral rim 16. At this time, a further actuation of the dispensing apparatus 1 is possible.

Thus, the regularity of actuation of the dispensing apparatus 1 can be controlled. The rate of 'leakage' of air from the expandable air chamber 36 may be altered by adjusting the material of the expandable air chamber 36 and/or the design of the one-way valve 33. For example, the rate of 'leakage' could be set to equate to a possible two actuations of the dispensing apparatus 1 every 24 hours.

The number of possible actuations of the apparatus 1 starting from the "at rest" position may also be altered by altering the dimensions of the expandable chamber 36, the volume of the bellows 30 and/or the size of the gap between the expandable chamber 36 and the inside of the split ring 40 in the "at rest" position.

Advantageously, the regularity of operation of the dispensing apparatus 1 is pre-set and tamper-resistant since the bellows 30, split ring 40 and expandable air chamber 36 are hidden from the user. In addition, the dispensing apparatus 1 appears similar to a conventional dispensing apparatus on the outside and actuation is accomplished in a conventional manner.

Figure 10 depicts a second embodiment of dispensing apparatus according to the present invention in which the bellows 30, plate 34, expandable air chamber 36 and split ring 40 are positioned beneath the valve 24 of the pressurised dispensing apparatus 23. Like components are referenced by like numerals. The valve stem receiving block 13 is provided with a screw thread formation 90

on its upper end to which the bellows support plate 34 is connected by means of a cooperating screw formation. As in the first embodiment, the bellows 30 is positioned above the bellows support plate 34 and the expandable chamber 36 beneath the support plate 34 with the one-way valve 33 position in between in the off-set aperture 51. Secondary longitudinal ribs 93 are provided at the lower end of the first housing portion 11 aligned with the longitudinal ribs 21 and longitudinally spaced therefrom. An underside of the expandable chamber 36 is supported on a secondary support plate 91 located on the valve stem receiving block 13 and spanning socket 26 between upper edges 94 of the secondary longitudinal ribs 93. An annular plate 95 is located over the valve stem 25 of the pressurised dispensing container 23 during assembly. The helical spring 39 extends between the annular plate 95 and an upper edge of the valve stem receiving block to bias the valve stem 25 of the pressurised dispensing container 23 a small distance away from an internal shoulder 92 of the mouthpiece duct 27 in the "at rest" position. Split ring 40 is located on the upper edges 94 of the secondary longitudinal ribs 93 aligned with the expandable chamber 36.

As in the first embodiment, an actuator button 15 is provided slidably received in the open end 14 of the first housing portion 11. However, the peripheral rim 16 of the actuator button 15 is elongated and provided with a number of downwardly projecting finger portions 96 located in between the longitudinal ribs 21 which extend down substantially the full length of the first housing portion 11 to a point a small distance above the location of the split ring 40. A centrally located spigot 60 may be provided as in the first embodiment.

To allow for easy assembly of the components of the second embodiment, the housing 10 preferably

comprises upper and lower sections 98 and 99 joined together by means of a screw thread formation 97 as shown in Figure 10.

Operation of the second embodiment is similar to that of the first embodiment. Downward movement of the actuator button 15 causes valve stem 25 to be moved into abutment with the internal shoulder 92 of mouthpiece duct 27. At the same time the annular plate 95 contact the bellows 30, sealing the inlet 31 such that on compression of the bellows 30 air is expelled from the bellows 30 into the expandable chamber 36 through the one-way valve 33. Further downward movement of the actuator button 15 causes the valve stem 15 to be depressed relative to the valve 24 actuating the pressurised dispensing container 23.

Successive actuations of the apparatus 1 cause the split ring 40 to be expanded such that the ring moves into alignment with the downwardly extending finger portions 96 of the actuator button 15 preventing downward movement of said finger portions 96 and preventing actuation of the dispensing apparatus 1. Unlocking of the apparatus occurs in the same manner as in the first embodiment.

The apparatus 1 of the present invention may also be easily adapted to produce an apparatus in which a predetermined number of actuations are possible before the apparatus becomes permanently locked. A potential problem with some pressurised dispensing containers is that the amount of product contained in a dispensed dose can become unreliable when the pressurised dispensing container is close to empty. To overcome this problem, expandable chamber 36 and one-way valve 33 may be designed not to "leak" any air. Thus the locking of the actuator button 15 is non-reversible. Once the required number of actuations have been made to move the split ring 40 radially outwards to lock the actuator button 15 the apparatus would be

discarded. The locking mechanism of the apparatus 1 may be calibrated to lock the actuator button 15 before the pressurised dispensing container 23 reaches a point where the dosage of product dispensed is liable to become unreliable. This ensures that a user replaces the apparatus 1 early enough to avoid the risk of receiving an inaccurate dose of product.

Whilst the present invention has been described in particular for use with a metered dose dispenser such as a pressurised dispensing container the present invention also includes the possibility for use with a dispenser comprising a pump. For example, the housing of a nasal pump spray for administering anti-histamine may be adapted to comprise the locking feature of the present invention. Likewise, other dispensing modes, such as injection of a liquid dose via a syringe, may incorporate the locking mechanism of the present invention.

Claims:

1. Dispensing apparatus (1) for dispensing a product comprising a housing (10) adapted to receive a dispensing container (23), a depressible actuator (15) for moving a dispensing container (23) relative to the housing (10) to release a dose of product, characterised by locking means (40) movable from a first position, in which the actuator (15) is free to move, to a second locked position, in which the actuator (15) is prevented from moving, an expandable chamber (36), means for expanding the expandable chamber (36) such that the locking means (40) is moved from the first position to the second position, and means for contracting the expandable chamber (36) at a controlled rate to release the locking means (40) and allow the actuator (15) to move.

2. Dispensing apparatus (1) as claimed in claim 1 in which the means for expanding the expandable chamber (36) comprises a bellows (30) and a one-way valve (33) is provided between the bellows (30) and the expandable chamber (36).

3. Dispensing apparatus (1) as claimed in any preceding claim wherein, following expansion, the means for contracting causes the expandable chamber (36) to contract at a predetermined rate.

4. Dispensing apparatus (1) as claimed in any preceding claim wherein the material of the expandable chamber (36) allows air to pass therethrough at a predetermined rate; the material forming the means for contracting the expandable chamber (36).

5. Dispensing apparatus (1) as claimed in claim 2 or claim 3 wherein the one-way valve (33) allows air to

leak out of the expandable chamber (36) at a predetermined rate; the one-way valve (33) forming the means for contracting the expandable chamber (36).

6. Dispensing apparatus (1) as claimed in any preceding claim wherein the locking means (40) comprises a split ring encircling the expandable chamber (36).

7. Dispensing apparatus (1) as claimed in claim 6 wherein the split ring (40) is supported on longitudinally formed ribs (21) of the housing (10).

8. Dispensing apparatus (1) as claimed in any preceding claim wherein the size of the expandable chamber (36) and the relative spacing of the expandable chamber (36) and locking means is such that the locking means (40) is moved from the first position to the second position after a predetermined number of actuations of the dispensing apparatus (1).

9. Dispensing apparatus (1) as claimed in any preceding claim wherein the depressible actuator (15) is cup-shaped and provided with a rim (16).

10. Dispensing apparatus (1) as claimed in any of claims 2 to 9 further comprising a plate (34) connected to the housing (10) located between the bellows (30) and the expandable chamber (36) and on which the bellows (30) is supported in use.

11. Dispensing apparatus (1) as claimed in claim 10 wherein the plate (34) is connected to the housing (10) be means of inwardly directed projections (35) on an inner surface of the housing (10).

12. Dispensing apparatus as claimed in claim 10 or claim 11 as dependant on claim 9 wherein the actuator rim (16) is provided with cut-out portions to accommodate movement of the actuator rim (16) past the bellows support plate (34).

13. Dispensing apparatus (1) as claimed in any preceding claim wherein the locking means (40), expandable chamber (36), means for expanding the expandable chamber (36) and means for contracting the expandable chamber (36) are located above a dispensing container (23) when inserted in the housing (10).

14. Dispensing apparatus as claimed in any of claims 1 to 12 wherein the locking means (40), expandable chamber (36), means for expanding the expandable chamber (36) and means for contracting the expandable chamber (36) are located beneath a dispensing container (23) when inserted in the housing (10).

15. Dispensing apparatus (1) as claimed in any preceding claim further comprising a pressurised dispensing container (23) received in the housing (10).

16. Dispensing apparatus (1) as claimed in claim 15 wherein the pressurised dispensing container (23) dispenses product in metered doses.

17. Dispensing apparatus (1) as claimed in any of claims 1 to 14 further comprising a pump dispenser.

18. Dispensing apparatus (1) as claimed in any of claims 1 to 14 further comprising a container having means for injecting a dose of product.

19. A method of regulating the operation of a dispensing apparatus (1) comprising the steps of setting a locking means (40) in a first position, in which position an actuator (15) is free to move, depressing the actuator (15) to thereby move a dispensing container (23) relative to a housing (10) to release a dose of product, characterised by arranging for successive depressions of the actuator (15) to incrementally expand an expandable chamber (36) positioned such that expansion of the expandable chamber (36) moves the locking means (40) to a second locked position, in which position the actuator (15) is prevented from moving, and arranging for the expandable chamber (36) to contract at a controlled rate to release the locking means (40) to allow the actuator (15) to move.

20. A method as claimed in claim 19 comprising setting the expandable chamber (36) to contract at a predetermined rate.

21. A method as claimed in claim 19 or claim 20 comprising moving the locking means (40) from the first position to the second position after a predetermined number of actuations of the dispensing apparatus (23).

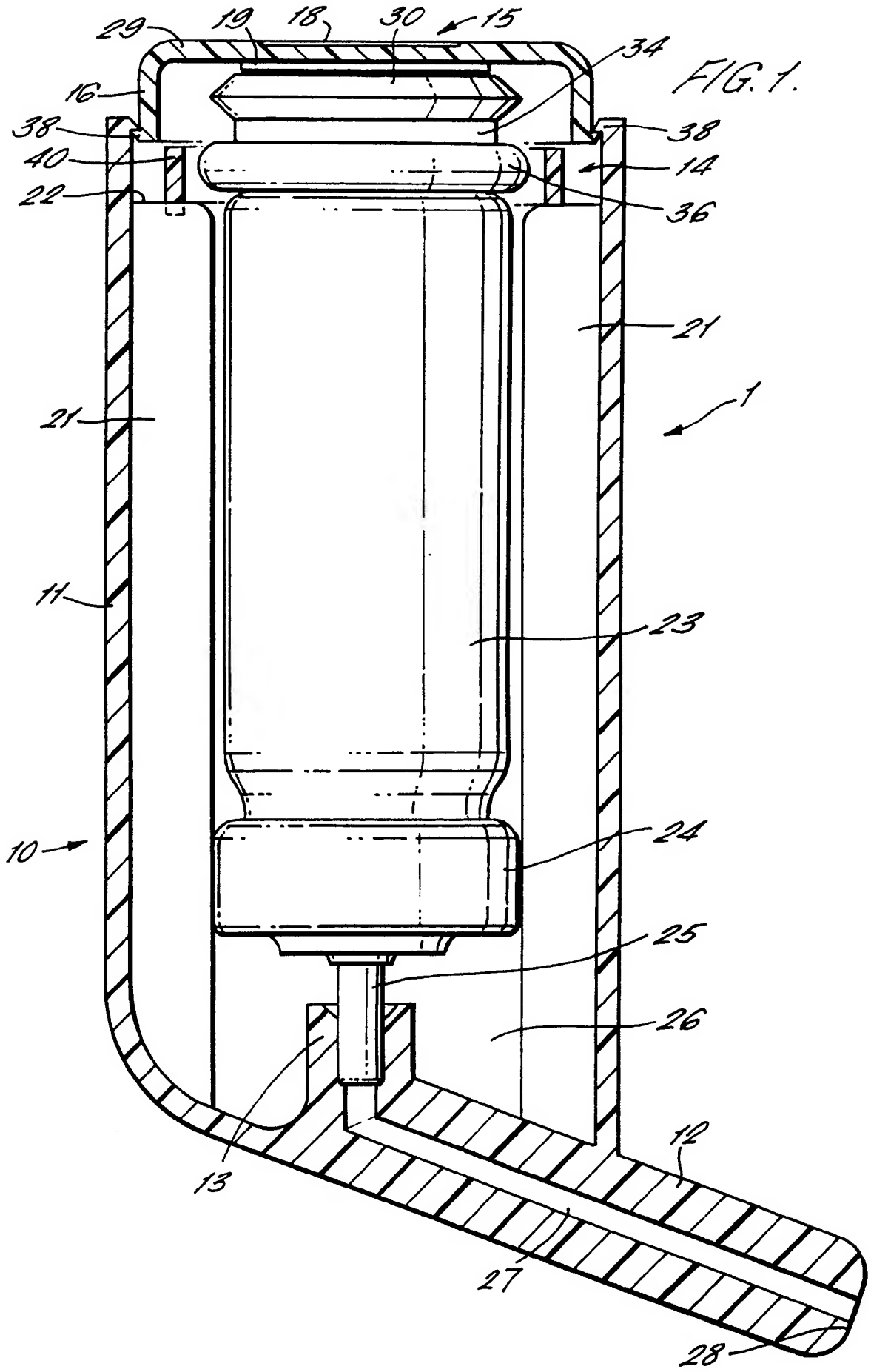
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FIG. 1.

FIG. 2.

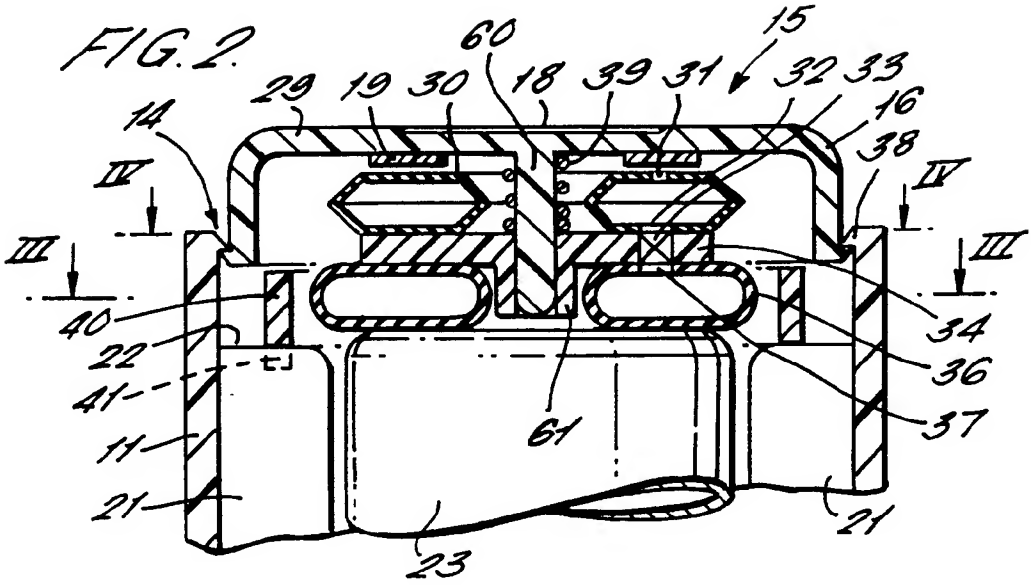
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FIG. 3.

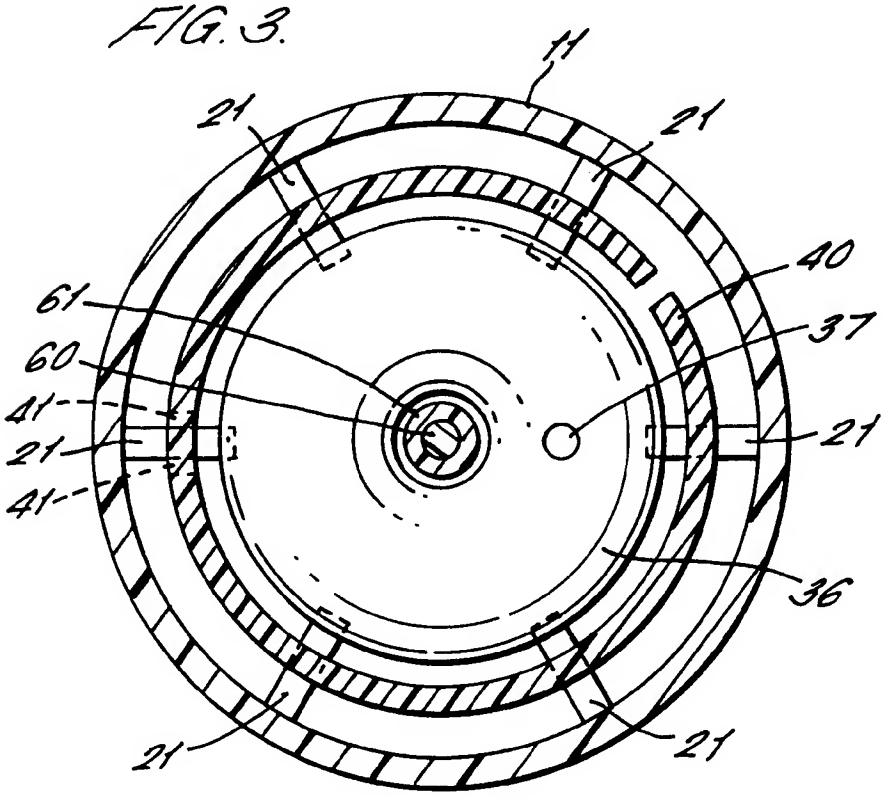
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FIG. 4.

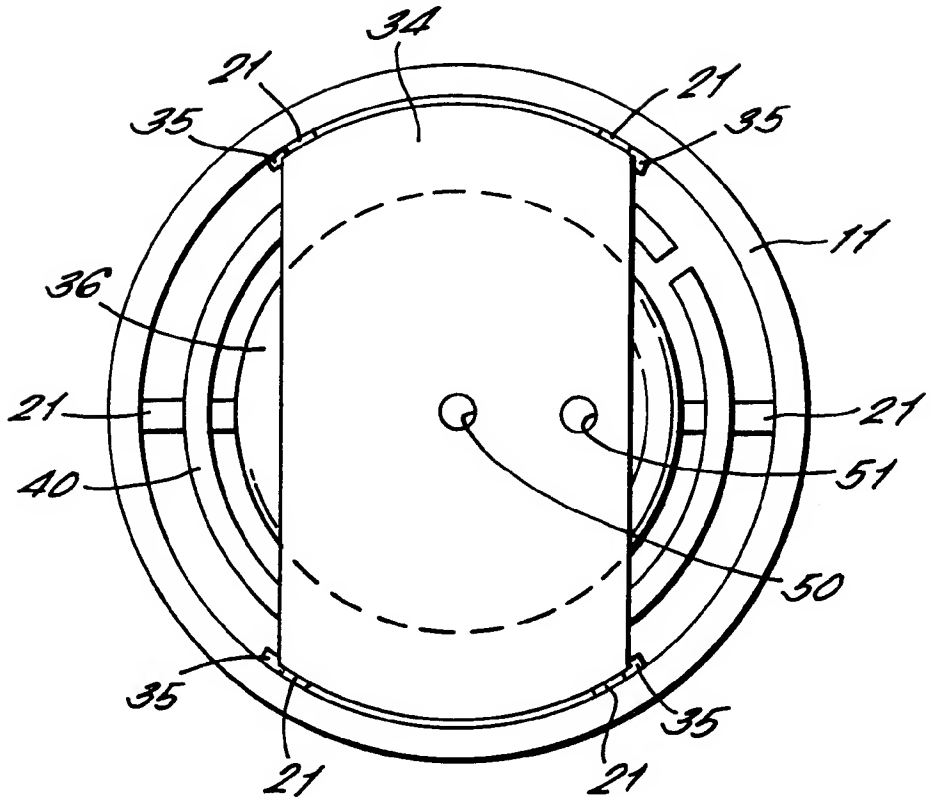

FIG. 5.

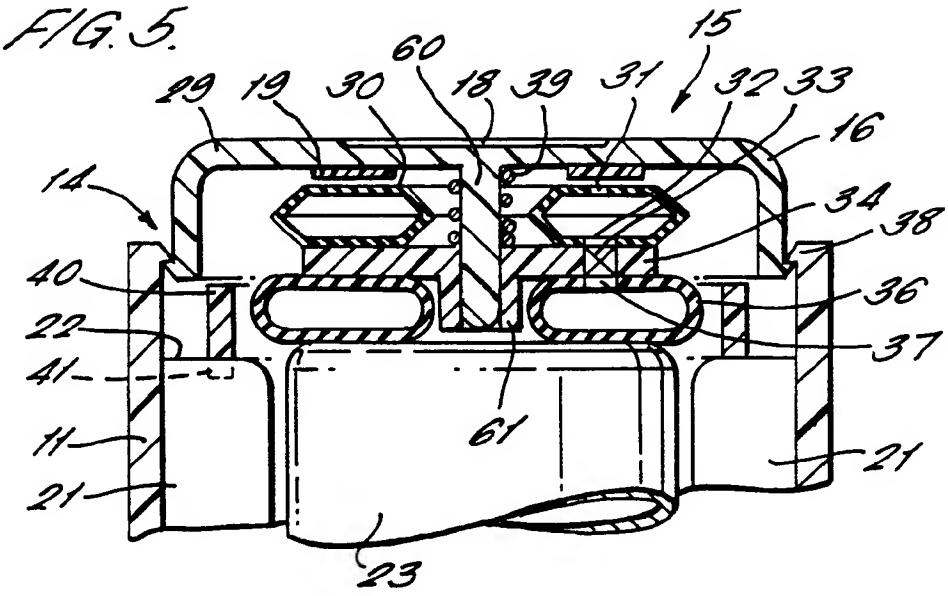

FIG. 6.

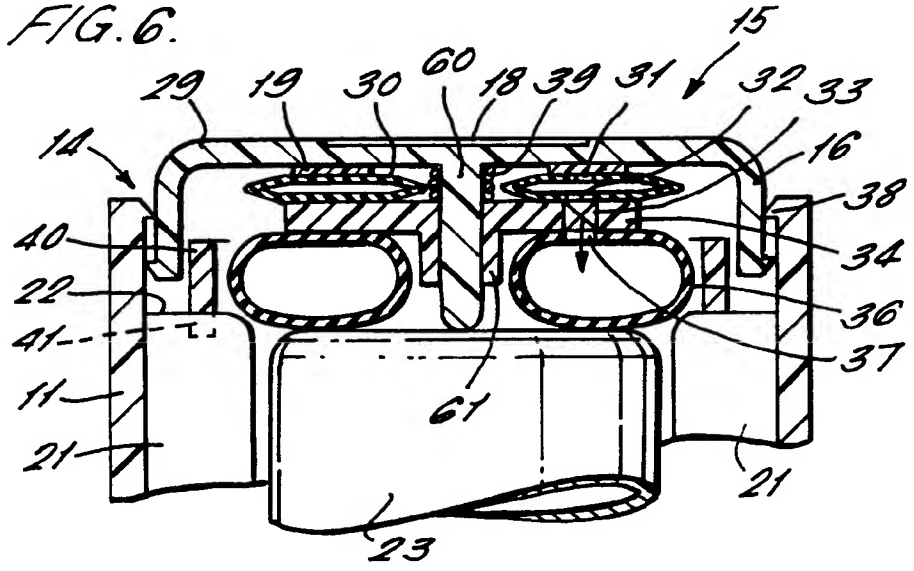

FIG. 7.

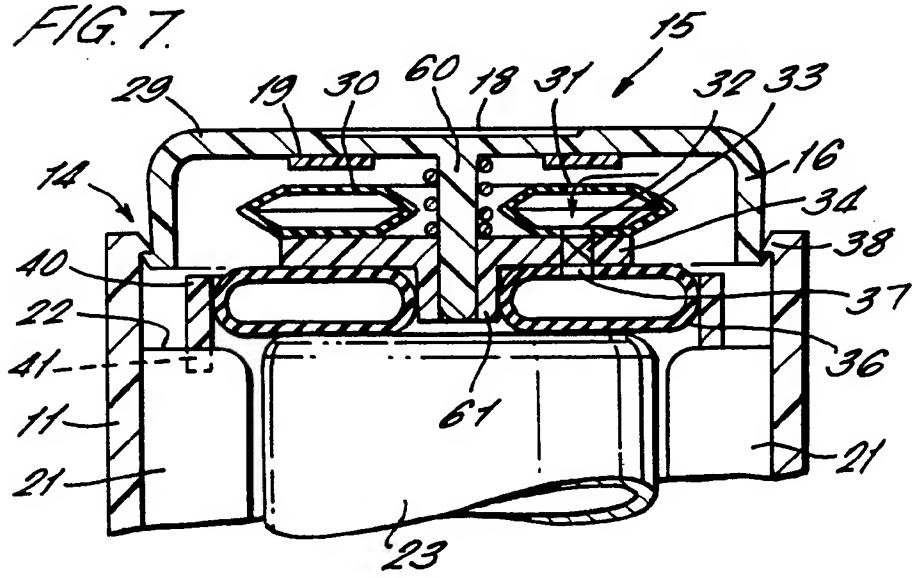

FIG. 8.

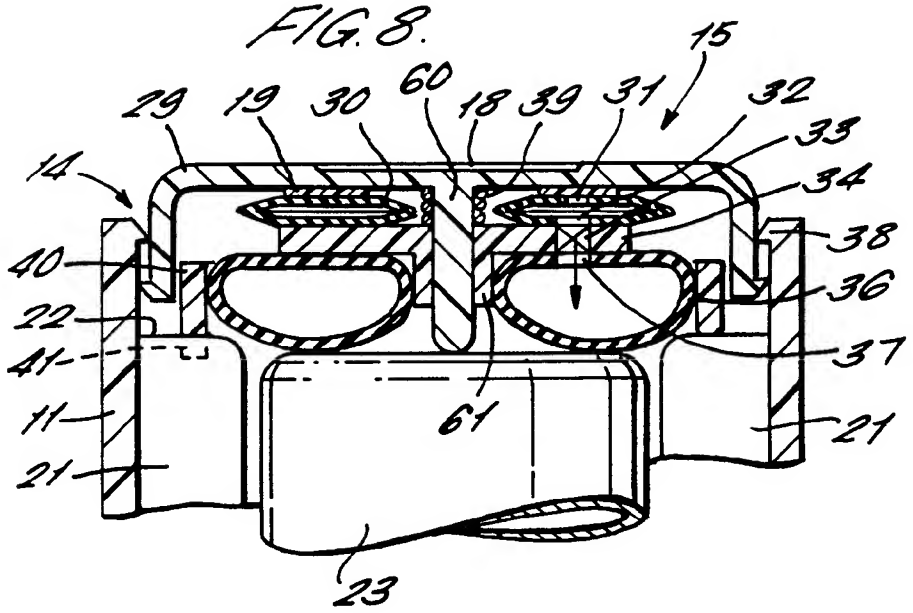
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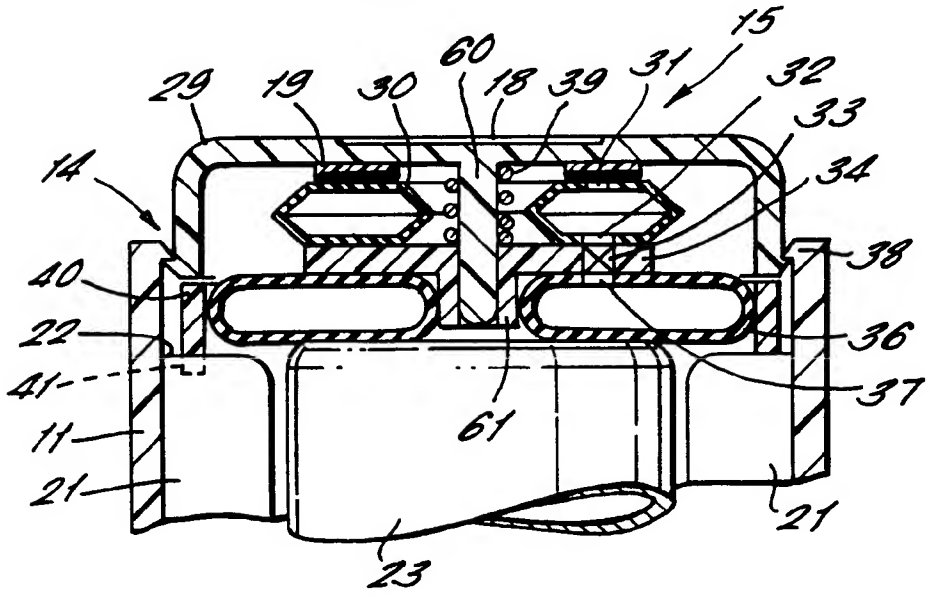
FIG. 9.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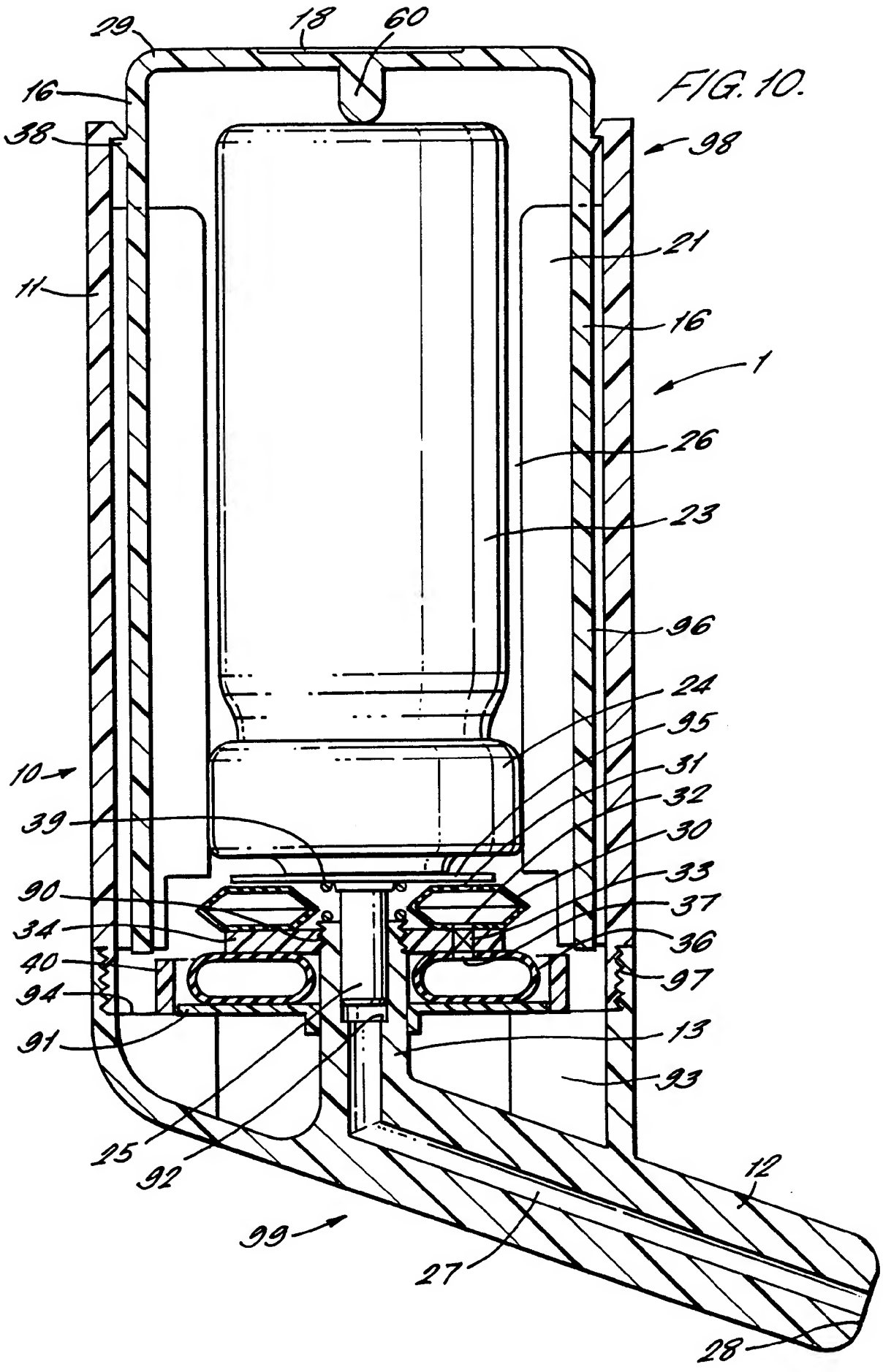
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FIG. 10.

INTERNATIONAL SEARCH REPORT

Interna il Application No
PCT/GB 00/02327

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65D83/14 A61M15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B65D A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 934 358 A (NILSSON SVEN-ERIK ET AL) 19 June 1990 (1990-06-19) column 1, line 67 -column 2, line 37; figures 1-3	1,19
A	US 5 879 336 A (BRINON THIERRY) 9 March 1999 (1999-03-09) column 1, line 1 - line 7 column 3, line 57 - line 60; figures 1-8	1
A	US 5 669 376 A (SIOUTAS CONSTANTINOS) 23 September 1997 (1997-09-23) figures 1-8	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 October 2000	23/10/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Fournier, J

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INTERNATIONAL SEARCH REPORT

...rmation on patent family members

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